Coastal Greenways: Interdisciplinarity and Integration Challenges for the Management of Developed Coastal Areas

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ABSTRACT


This paper presents the first Greenways studies for a Portuguese coastal area. This first approach shall be considered not as a strict detailed plan, but as a schematic vision, which became possible by Geographic Information Technologies - Remote Sensing and Geographic Information Systems. Integrated template data are human pressures (urban sprawling, rail and motorways), cultural and historic heritage, scenic places, ecology (Natura 2000 biotopes and existing Protected Areas) and other natural values to be protected (streams and ridges). Some major areas where natural hazards may occur (erosion, floods, etc.) are also identified. A first attempt to apply the GAP-analysis procedures had as the outcome, 7 main Greenways. They connect “Greenspaces”, either to prevent isolation or to strengthen the network as a whole. We advance some very basic ideas for coastal greenways network of protected areas forming a mosaic of large and small nodes linked with corridors, and managed for multiple purposes.

ADDITIONAL INDEX WORDS: ICZM, environmental planning, GIS.

INTRODUCTION

At the European level the Greenways concept is increasingly drawing more attention. This international movement led recently to the setup of the European Greenways Association as well as some other national associations like the Spanish, the Italian and the Portuguese. This is an important step towards a European Network, which may integrate national and regional Greenways.

In Portugal the vast majority of the human activities, and consequently the higher population densities, are concentrated along the coast. Such is the case of the Metropolitan Area of Lisbon (MAL), with 27% of the total Portuguese population (2 540 276 inhabitants) distributed by an area of 3 070 square km, which spreads along an extensive Atlantic coastal line and two important estuaries Tagus’ and Sado’s. (Figure 1)

This growth of the coastal areas leads to industrial and urban pressures that contribute to an unbalanced occupation of the land as well as rising contamination problems and fragmentation of native habitats. Therefore, there’s an urgent need for a proper management on the MAL, aiming not only the correction of the present problems but also the protection of sensible areas that still enjoy an ecological balance (MACHADO et al., 2001)

When analysing a coastal area such as the Metropolitan Area of Lisbon, which is experiencing very rapid urban expansion, some fundamental questions arise that have to be answered before any planning or political actions are to be taken:

• What model of coastal areas do we want to leave for future generations?
• What are the values and intentions that this model expresses?
• Which plans and programs should be settled to implement the model?
• How to start with the necessary means and which agents will carry out these actions?

Environmental or landscape planning is in fact very complex, since it depends on a group of activities of a multi-disciplinary nature with simultaneous political, scientific and technical considerations. Overlaying all of these are the larger ethical questions asked above. As part of an international movement, the concept of Greenways was born to answer this dilemma of modern society: to mitigate the negative effects of economic growth, and to protect existing environmental qualities in a strategic manner, by concentrating on areas of increased pressures.

In fact, in the regions of greater concentration, if the urban spread is not controlled by a clear structure of protected areas, there is the risk of destroying through its course, the resources necessary to a sustainable development - a fundamental aim regularly recommended by many national and international organisations. Only then, will it be possible to secure the quality of life, or even, according to some, to secure the survival of future generations.

Greenways, by definition, establish connections between areas of increased ecological, landscape and cultural resources, promoting their protection and compatibility with human activities. It is based on the concept of network, meaning a set of ways, connected between themselves, with the aim of land management, but also with the view of protecting/preserving, administering and creating recreational areas. It holds, therefore, an ecological function as well as social, economical, cultural, historical and balancing ones, between the biotic, abiotic and anthropological elements, adding value to the landscape (MACHADO et al., 1997; AHERN, 1999 and AHERN, 2002).

As previously mentioned, the MAL, is a coastal area under anthropic pressure generated by the rapidly development of urbanization, causing a fast and intense fragmentation of natural habitats. We believe that Greenways, understood under a perspective of land use management and as an instrument of environmental planning, could represent a solid and efficient set of methods for the resolution of problems arising from the human occupation of areas as complex and fragile as the coastal areas. Thus, “coastal greenways” could perform essential functions on the landscape, promoting the conservation of natural resources (such as beaches, dunes, cliffs, native vegetation, coastal streams, estuaries, saltmarshes, etc), as well as historical and cultural ones (forts, lighthouses, historical centres, etc), standing as a network of “open” spaces, compatible with human uses and establishing the connection between protected areas (such as natural parks, Natura
METHODS

In coastal areas under strong anthropic pressure, namely areas of higher urban density, Greenways, should be understood as an additional and essential infra-structure for the balancing of the coast, together with the road network, water and electricity supplies, etc. This “green infra-structure” should provide support for the landscape and native coastal ecosystems. It should also serve as an ecological “corridor”, providing habitats for both fauna and flora, establishing itself as a filter of clean air and water. At the same time, it should also address social and cultural functions, promoting an aesthetical and landscape balance, providing the local urban population with clear recreation and environmental education areas. The Greenways network is essential for the environmental well-being of urban communities and vital for the sustained survival of the local native coastal ecosystems.

Looking for a Coastal Greenways Network vision plan, the method used was the identification of great gaps, where protection should be established, barriers eliminated, and links between the already protected main areas established. In essence, the method builds upon two discrete analysis. The protected land set, indicates those areas that are currently protected from land use change and urban development and the greenways resource set analysis aggregates all those classes of biotic, abiotic, cultural and recreational resources that should be protected as determined by consensus (FERREIRA and MACHADO, 2001).

The area of the Municipality of Cascais (one of the areas of the LMA) was chosen for the application of the developed set of methods (Figure 1). This is a coastal area with strong anthropic pressures, namely real estate housing developments, as well as touristic and recreational ones, having at the same time some unique natural values that should be preserved and valued (PONTES, 1999).

The effectiveness of this methodology takes hold of a large set of information of spatial characteristics which led to the need of using the Geographical Information Technologies (GIT), namely Remote Sensing and Geographic Information Systems. The GIT provide a vast number of techniques and methods with a higher capability of integration, management and analysis of a large set of variables, arising from different sources with distinctive natures, allowing at the same time the possibility of “scenario setting”.

The final result of this methodology was a preliminary network plan for the coastal Municipality of Cascais, with the framework strategy detailed in figure 2. This plan can be viewed as an important first step in what is expected to be a continuing planning process for a Coastal Greenway Plan.

In defining the preliminary network, we have tried to apply the concept of coastal environment greenway, thus, trying to interpret, understand and to evaluate the relationships between the coast itself (land-water interface) and the land area immediately nearby. It integrates, not only the elements of the coastal system, but also the systems that directly contribute to it as well as those that are adjacent, such as fluvial systems. This way, the coastal greenway is essentially formed by the beaches, dunes and coastal cliffs, with the associated fauna and floral elements. This concept seeks to understand and interpret the functioning of coastal ecosystems under a holistic perspective (BUENO et al., 1995), allowing the systems’ integration and the adaptation of management strategies based on the physical, chemical, biological and human relationships taking place. Therefore, we have, thus, defined the main characteristics, as well as the ecological and social functions, of the framework of coastal greenways to be as indicated below.

Under an ecological point of view, coastal greenways, present the following ecological characteristics:

a) Continuous, linear or curve structure, related with the morphological characteristics;

b) High degree of connection with adjoining systems, such as water systems, acting simultaneously as an element of bonding;

c) Providing a number of elements for protection and life-supporting, acting as an habitat for a vast number of species;

d) Existence of gradients, namely gradual shifts on the composition and abundance of different species, providing circulation and movement functions for biological species;

e) Filter and barrier effects;

f) Rich and diverse landscape, with an increased scenic value.

Therefore, Coastal Greenways have important ecological functions:

- Protection of natural areas, providing habitats for plants and animals, supporting the preservation of biodiversity, preventing the isolation of species and maintaining the natural demographic processes;

- Protection of the typical vegetation of coastal ecosystems, providing organic matter to serve as food to the local fauna. On an urban environment, this vegetation functions as a urban networks, etc), parks and other recreational areas (such as public gardens, trails, bike-ways, seawalks, etc).
filter, improving the quality of the air and promoting the transport of matter, energy and micro-organisms; it also provides protection for urban areas, namely acting positively on hydric processes, reducing the risk of erosion;

- A well-structured network of Coastal Greenways, could help the biotic communities to adapt to long course environmental changes.

It all sums up as a unity of natural landscape patches, avoiding their isolation and keeping the biological diversity and the ecological balance. They play a fundamental role on the conservation of nature and should include areas with unique characteristics, of ecological and landscape value, as well as scientific, cultural and social relevancy.

Besides their enormous ecological value, Coastal Greenways, have an important social function, especially in areas such as urban ones, namely:

a) They provide areas for recreation and leisure. They provide recreational spaces for urban areas and access ways to natural areas. They are based on natural ways, canals, abandoned railroads and other already-existing paths such as seawalks, bike and walking ways, providing an alternative to motorways and the associated problems, improving the quality of life of neighbouring populations;

b) They allow the protection and add value to the historical and cultural real estate including historical paths; The different phases of evolution of a certain landscape have specific traits on the pertained area, which remain as living testimonies from the past; this heritage has great value, providing an integration on the collective memory as well as a basis for the local, regional or even national identity;

c) They promote a strong sense of community and multicultural area. By establishing greenways the connection of communities and municipalities is possible, even between those with different natural, historical and cultural heritages;

d) They allow for the conservation and create an added-value aesthetics sense of the landscape, as in the cases of environmental education and historical and leisure walks.

RESULTS AND ANALYSIS

The results we have reached, in accordance with the procedures previously described, have lead to the identification of the Greenways presented in figure 3. They have allowed us to establish the following preliminary structure:

Fundamental Structure

Primary

A coastal greenway formed by two distinct parts, classified in accordance to their functions and characteristics:

The Costa do Sol Greenway (Greenway 1), is based mainly on the protection and the conservation of the existing real estate elements, such as cultural sites, manors and mansions, besides building up on the existing morphologies, due to its high scenic and landscape value. This Greenway, essentially cultural, functions as a connection between the eastern part of the municipality and its central point, the village of Cascais, where a high density of heritage elements stand, along an area of great beauty and sensibility, the coastal line (part of the National Ecologic Reserve, occupying almost 53 acres). All along the coast, beaches can also be found, which are highly used during the bathing season (beach areas reaching a total of 59 acres) as well as some seawalks that provide leisure and recreational elements.

The Sintra-Cascais Scenic Greenway (Greenway 2), includes a vast variety of different situations, such as ecologically sensitive areas (239 acres of the National Ecologic Reserve), the botanical reserve especially connected with research projects and environmental education (243 acres of landscape and natural resources) and other areas subjected to strong seasonal

Figure 2. Greenway Planning Framework Strategy for the coastal municipality of Cascais.
pressures, such as the dune system and the beaches (162 acres). Following the coastal line, along the Sintra Mountain, this greenway includes the promotion and the protection of the natural real estate, as part of the Natural Park, serving at the same time as a support for leisure and recreational activities. The compatibility of these uses should be based the primordial importance of the existing natural resources, not subduing them to the recreational needs. Taking in consideration that the Natural Park of Sintra has already defined some cycle, horse and pedestrian walks, the proposed greenway should include them, or even be based on them, allowing the strengthening of the existing trails and promoting an increased use of these, as long as they do not come into conflict with the proposed goals of natural preservation of this area.

Secondary
The Penha Longa Greenway (Greenway 3), the Vinhas Greenway (Greenway 4) and the Manique Greenway (Greenway 5), all valley areas, suggest the establishment of perpendicular connections between the inner municipality and the coastal seafine. As previously mentioned, water streams in these greenways, are valuable ecologic resources that increase the land balance, representing a vast potential for leisure and recreation by connecting with other areas with such a vocation as the forests (for example, the Vinhas Greenways is structured based upon a water stream and vegetation areas). The areas of the National Ecologic Reserve and those of the National Agriculture Reserve that are included, fully justify the boundaries of the greenways.

Transversal Structure
The A-5 Greenway (6) is located, approximately halfway across the municipality, along the main motorway. This greenway serves as a scenic framework for the Lisbon-Cascais highway, from the Manique stream up until the coast, nearby the Guincho beach. Thus, it can be useful in providing a boundary for the rural use of the farming areas located north and being a green axis for the boundaries of the fast growing urban areas located south. This greenway is structured by the several real estate elements, strengthened by the existence of agricultural areas and possible working paths that allowed the connection between them, which could represent areas of cultural interest.

The proposed network of Greenways, detailed in Figure 4, is mainly an hypothesis that should naturally be confronted with two major realities: the existing urban areas and those proposed by the Municipalities’ Management Plans, aiming at the identification of those areas posing potential conflict, or empty areas (GAPs), representing a barrier to the flow of the greenway, thus standing as a lack of continuum in a greenway, by not exhibiting identifiable resources, that could allow the establishment of connections.

DISCUSSION AND CONCLUSIONS
As we have presented, Greenways, perform three major functions, all essential on the landscape, helping to protect and promoting the natural, historical and cultural resources, by providing a network of “open spaces” compatible with human use and keeping and establishing the bounding between protected areas, parks, reserves and other recreational and leisure spaces, as well as cultural and historical sites (SEARNS, 1995). This network is essential for the well-being of the urban communities and vital for the survival of the native coastal ecosystems.

The Municipality of Cascais, due to the complex nature of the dominant bio-physical system, the coast, has a territory with a large ecological diversity and sensitivity, along a strong human pressure. The proposals for these greenways were based mainly on the coast and the major water streams, with the main potentially conflicting areas identified as those overlapping with the urban areas and those expected to experience real estate urban development. Thus, we have reached a setting of greenways, on an urban environment that could increase leisure and the quality of urban environment. They are set along the coastal line, historically more occupied (Greenways 1) as well as along the water streams (Greenways 3). These will require more concerns in addressing issues such as planning, construction and management. Nevertheless, the ecological function should not be overlooked, providing the basis for the sustained conservation of the landscape.

Greenway number 2, is formed by areas where the conservation of nature reveals itself to be a priority and the planning of recreational infra-structures should be carefully addressed, with restrictions considered under their management, as a way to avoid negative ecologic impacts.
Nevertheless, areas of extreme ecological sensibility should be considered for seriously restricted use. By doing so, we shall be protecting the integrity of natural systems as well as helping the population to know, understand and appreciate nature and its vast and immensely valuable resources, which we need to keep in order to achieve a sustained development.

Providing an answer to an ever-increasingly demanding population on their leisure time, promoting the safeguard of natural and constructed values, the Greenways, allow the avoidance of emergency and recovery solutions, usually artificial and complex, as well as expensive. The use of the philosophy underneath the Greenways concept, allows for a proper land management of the coastal and catchments’ areas.

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LITERATURE CITED


